

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. – 31. (Cancelled)

32. (New) An apparatus comprising:

a silicon substrate; and

a microresonator disposed on the silicon substrate, the microresonator having an annular structure to recirculate light at a desired wavelength, the microresonator including one or more of silicon nanocrystals and silicon-germanium nanocrystals.

33. (New) An apparatus as claimed in claim 32, further comprising at least one waveguide disposed on the silicon substrate wherein light may be coupled between the microresonator and the waveguide.

34. (New) An apparatus as claimed in claim 33, wherein the waveguide is above the microresonator.

35. (New) An apparatus as claimed in claim 33, wherein the microresonator is coupled between two waveguides.

36. (New) An apparatus as claimed in claim 32, wherein the annular structure is a ring.

37. (New) An apparatus as claimed in claim 36, wherein the ring has a length from a center of the ring to a center of a waveguide that forms the ring being proportional to an integer multiple of a desired wavelength.

38. (New) An apparatus as claimed in claim 32, wherein the annular structure is a disk.
39. (New) An apparatus as claimed in claim 38, wherein the disk has a perimeter that is an integer multiple of a wavelength.
40. (New) An apparatus as claimed in claim 32, wherein the nanocrystals are included in at least one of silicon dioxide, silicon nitride, and alumino-silicate.
41. (New) An apparatus as claimed in claim 32, wherein the microresonator includes one or more rare earth elements.
42. (New) An apparatus as claimed in claim 41, wherein the one or more rare earth elements includes at least one of erbium and ytterbium.
43. (New) An apparatus as claimed in claim 32, further comprising a pump above or below the microresonator to excite circulation of light in the microresonator.
44. (New) An apparatus as claimed in claim 32, further comprising a pump to excite circulation of light in the microresonator, the pump to tunnel current through silicon dioxide to form electron-hole pairs in the nanocrystals in the silicon dioxide.
45. (New) An apparatus comprising:
- a silicon substrate;
- a microresonator disposed on the silicon substrate, the microresonator having an annular structure to recirculate light at a desired wavelength, wherein the microresonator includes silicon nanocrystals, silicon-germanium nanocrystals, or a combination thereof; and

a waveguide disposed above and optically coupled with the microresonator.

46. (New) An apparatus as claimed in claim 45, wherein a distance between the waveguide and the microresonator is equal to or less than 250 nanometers.
47. (New) An apparatus as claimed in claim 45, further comprising a second waveguide optically coupled with the microresonator.
48. (New) An apparatus as claimed in claim 45, wherein the annular structure is a ring having a length from a center of the ring to a center of a waveguide that forms the ring being proportional to an integer multiple of a desired wavelength.
49. (New) An apparatus as claimed in claim 45, wherein the annular structure is a disk having a perimeter that is an integer multiple of a wavelength.
50. (New) An apparatus as claimed in claim 45, wherein the microresonator includes one or more rare earth elements.
51. (New) An apparatus as claimed in claim 45, further comprising a pump above or below the microresonator to excite circulation of light in the microresonator.
52. (New) An apparatus as claimed in claim 45, further comprising a pump to excite circulation of light in the microresonator, the pump to tunnel current through silicon dioxide to form electron-hole pairs in the nanocrystals in the silicon dioxide.